

PreAP Precalculus

TEST Chapter 3.1-3.4 Form A. No Calculator Permitted

Part I: Multiple Choice

A calculator will be permitted for this section. Put your CAPITAL LETTER answer choice in the blank to the left of the number.

\_\_\_\_\_ 1. Let  $R, S, T,$  and  $V$  be the roots of  $2x^4 - 17x^3 + 6x^2 + 17x - 8$ . Find the product  $RSTV$ .  
 (A) 24 (B) -8 (C) 8 (D) 4 (E) -4

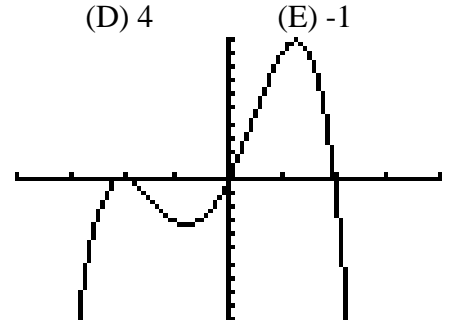
\_\_\_\_\_ 2. Simplify:  $i^{487} =$   
 (A)  $i$  (B)  $-1$  (C)  $1$  (D)  $-i$  (E)  $0$

\_\_\_\_\_ 3. Which of the following MUST be true about a polynomial function of even degree?  
 (A) It is an even function (B) It has no real solutions (C) It has an odd number of complex roots  
 (D) It has at least one irrational root (E) It has an odd number of relative extrema

\_\_\_\_\_ 4. A linear factor of  $x^3 - x^2 - 10x - 8$  is  $(x + 1)$  and what other possible factor?  
 (A)  $x + 2$  (B)  $x + 3$  (C)  $x - 2$  (D)  $x - 3$  (E)  $x - 1$

\_\_\_\_\_ 5. The value of  $k$  that will make  $x + 1$  a factor of  $kx^3 - 17x^2 - 4kx + 8$  is:  
 (A)  $-3$  (B)  $3$  (C)  $-5$  (D)  $4$  (E)  $-1$

\_\_\_\_\_ 6. Which of the specified functions might have the given graph?  
 (A)  $f(x) = x(x + 2)^2(x - 2)$  (B)  $f(x) = -x^2(x + 2)(2 - x)$   
 (C)  $f(x) = x(x + 2)^2(2 - x)$  (D)  $f(x) = x(x + 2)(x - 2)^2$   
 (E)  $f(x) = -x(x + 2)(x - 2)^2$



\_\_\_\_\_ 7. If a function of degree 6 has roots of  $-1, 2, \sqrt{2} + 1$  and  $i + 1$ , the other root must be:  
 (A)  $\sqrt{2} - 1$  (B)  $1 - \sqrt{2}$  (C)  $i - 1$  (D)  $-2$  (E)  $-i - 1$

\_\_\_\_\_ 8. What is the remainder when  $f(x) = 2(x - 1)^3 + 9$  is divided by  $x$ ?  
 (A) 7 (B) 5 (C) 3 (D) 2 (E) 1

\_\_\_\_\_ 9. An equation of a polynomial of the form  $y = Af(x)$  of lowest degree with the following characteristics  $f(0) = -5, f(1) = 0, f(i) = 0,$  and  $f(\sqrt{2}) = 0$  has a vertical dilation value of  $A =$   
 (A)  $-1$  (B)  $\frac{2}{3}$  (C)  $3$  (D)  $-\frac{5}{2}$  (E)  $-\frac{4}{3}$

\_\_\_\_\_ 10. An equation of an 8<sup>th</sup> degree polynomial with a negative leading coefficient whose only roots are  $x = -5(m2), x = -1(m2), x = 3(m3)$  and  $x = 5(m1)$  has how many relative extrema?  
 (A) 3 (B) 4 (C) 5 (D) 6 (E) 7



Part II: Free Response

Show all work and proper notation in the space provided below or to the right of each problem. Be sure to label your work corresponding to each part a), b), c), etc.

11. For  $h(x) = -14x^6 + 166x^2 - 16x^4 + 2x^7 + 24 + 8x^5 + 30x^3 + 120x$

a) Find the range of  $h(x)$

b) What is the coordinate of the y-intercept of  $h(x)$  ?

c) List the distinct, possible rational roots

d) Given that  $x = 2i$ ,  $x = 1 + \sqrt{2}$ , and  $x = -1$  are all roots of  $h(x)$ , use (and show) synthetic division to find all the exact values of the other complex roots. List all your final roots at the ends as  $x =$

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